# RJK0651DPB

60V, 25A, 14mΩ max.
Silicon N Channel Power MOS FET
Power Switching

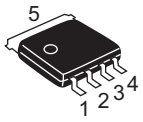
R07DS0076EJ0200
Rev.2.00
Apr 09, 2013

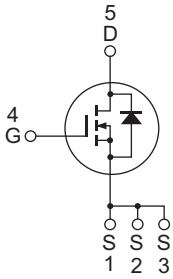
## Features

- High speed switching
- Capable of 4.5 V gate drive
- Low drive current
- High density mounting
- Low on-resistance
  $R_{DS(on)}$ = 11 mΩ typ. (at $V_{GS}$ = 10 V)
- Pb-free
- Halogen-free

## Outline

RENESAS Package code: PTZZ0005DA-A
(Package name: LFPAK)




| | |
|---|---|
| 1, 2, 3 | Source |
| 4 | Gate |
| 5 | Drain |

## Application

- Switching Mode Power Supply

## Absolute Maximum Ratings

(Ta = 25°C)

| Item | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain to source voltage | $V_{DSS}$ | 60 | V |
| Gate to source voltage | $V_{GSS}$ | ±20 | V |
| Drain current | $I_D$ | 25 | A |
| Drain peak current | $I_{D(pulse)}$ Note1 | 100 | A |
| Body-drain diode reverse drain current | $I_{DR}$ | 25 | A |
| Avalanche current | $I_{AP}$ Note 2 | 12.5 | A |
| Avalanche energy | $E_{AS}$ Note 2 | 11.7 | mJ |
| Channel dissipation | Pch Note3 | 45 | W |
| Channel to Case Thermal Resistance | θch-C | 2.78 | °C/W |
| Channel temperature | Tch | 150 | °C |
| Storage temperature | Tstg | –55 to +150 | °C |

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%
2. Value at Tch = 25°C, Rg ≥ 50 Ω
3. Tc = 25°C

This product is for the low voltage drive (≤ 10V).
If the driving voltage is over 10 V under normal conditions, please use the product for high gate to source cutoff voltage ($V_{GS(off)}$) which characteristics has been improved.

## Electrical Characteristics

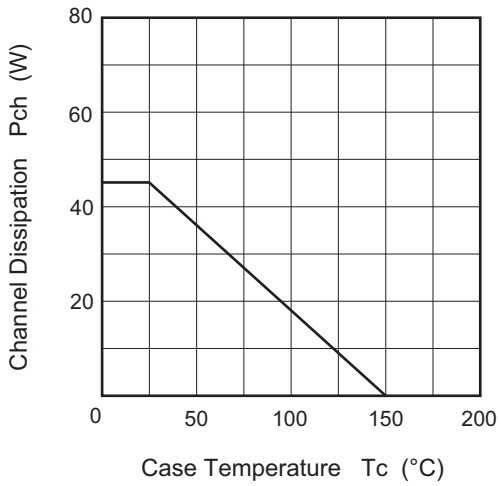
(Ta = 25°C)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 60 | — | — | V | $I_D$ = 10 mA, $V_{GS}$ = 0 V |
| Gate to source leak current | $I_{GSS}$ | — | — | ±0.1 | μA | $V_{GS}$ = ±20 V, $V_{DS}$ = 0 V |
| Zero gate voltage drain current | $I_{DSS}$ | — | — | 1 | μA | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V |
| Gate to source cutoff voltage | $V_{GS(off)}$ | 1.2 | — | 2.5 | V | $V_{DS}$ = 10 V, $I_D$ = 1 mA |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 11 | 14 | mΩ | $I_D$ = 12.5 A, $V_{GS}$ = 10 V Note4 |
| | $R_{DS(on)}$ | — | 13 | 18 | mΩ | $I_D$ = 12.5 A, $V_{GS}$ = 4.5 V Note4 |
| Forward transfer admittance | $\|y_{fs}\|$ | — | 40 | — | S | $I_D$ = 12.5 A, $V_{DS}$ = 10 V Note4 |
| Input capacitance | Ciss | — | 2030 | — | pF | $V_{DS}$ = 10 V, $V_{GS}$ = 0 V, f = 1 MHz |
| Output capacitance | Coss | — | 250 | — | pF | |
| Reverse transfer capacitance | Crss | — | 100 | — | pF | |
| Gate Resistance | Rg | — | 0.7 | — | Ω | |
| Total gate charge | Qg | — | 15 | — | nC | $V_{DD}$ = 25 V, $V_{GS}$ = 4.5 V, $I_D$ = 25 A |
| Gate to source charge | Qgs | — | 6.7 | — | nC | |
| Gate to drain charge | Qgd | — | 3.7 | — | nC | |
| Turn-on delay time | $t_{d(on)}$ | — | 8.4 | — | ns | $V_{GS}$ = 10 V, $I_D$ = 12.5 A, $V_{DD}$ ≅ 30 V, $R_L$ = 2.4 Ω, Rg = 4.7 Ω |
| Rise time | $t_r$ | — | 4.4 | — | ns | |
| Turn-off delay time | $t_{d(off)}$ | — | 42 | — | ns | |
| Fall time | $t_f$ | — | 6.8 | — | ns | |
| Body–drain diode forward voltage | $V_{DF}$ | — | 0.83 | 1.1 | V | $I_F$ = 25 A, $V_{GS}$ = 0 V Note4 |
| Body–drain diode reverse recovery time | $t_{rr}$ | — | 32 | — | ns | $I_F$ = 25 A, $V_{GS}$ = 0 V $di_F$/ dt = 100 A/ μs |

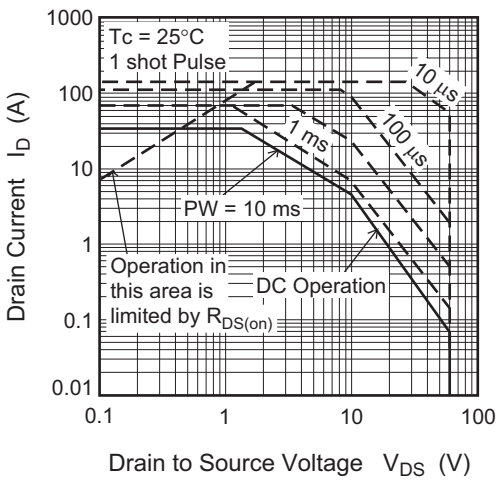
Notes: 4. Pulse test

## Main Characteristics

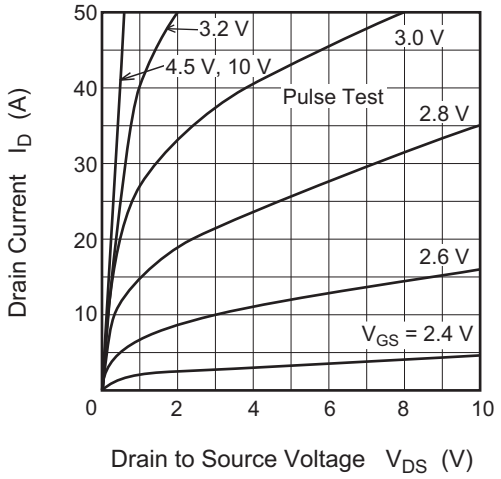
Power vs. Temperature Derating



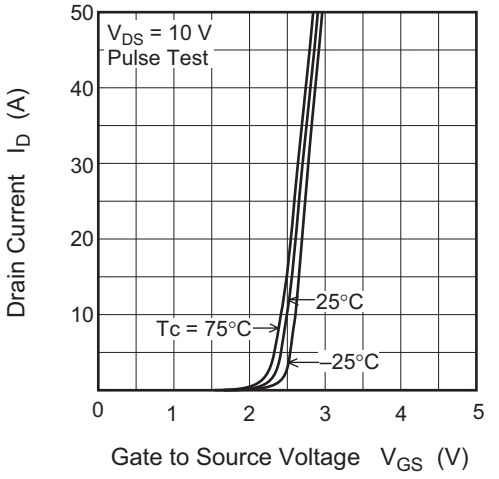

Maximum Safe Operation Area



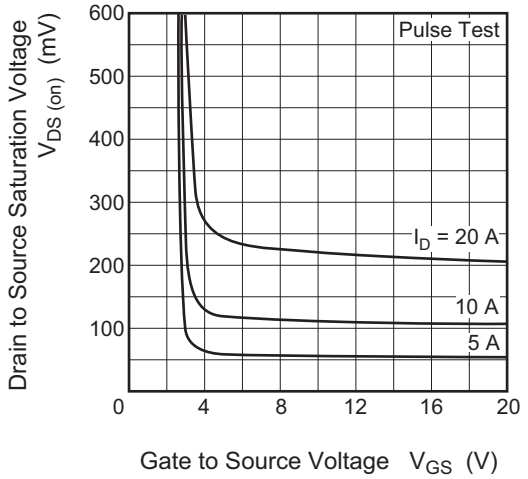

Typical Output Characteristics



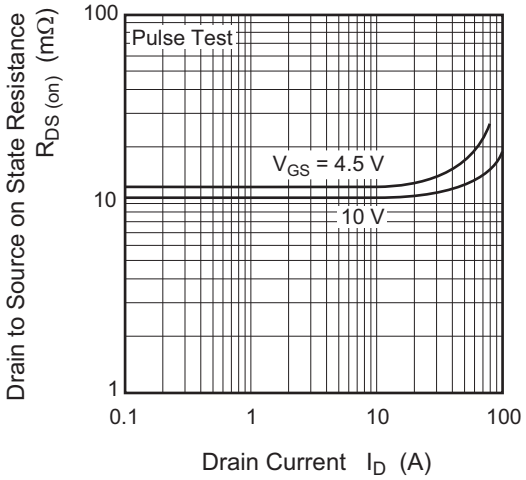

Typical Transfer Characteristics



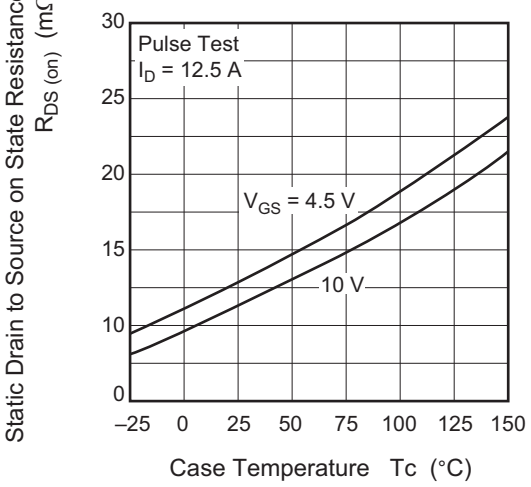

Drain to Source Saturation Voltage vs. Gate to Source Voltage



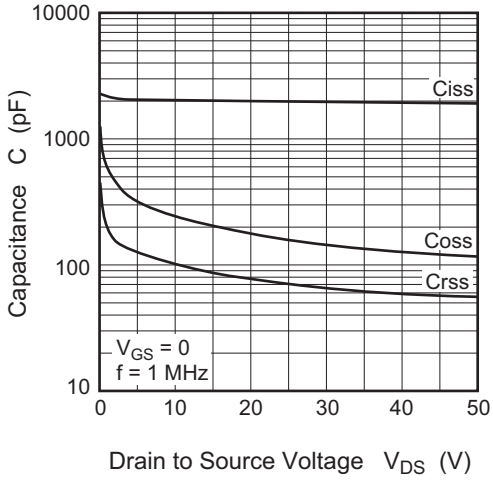

Static Drain to Source on State Resistance vs. Drain Current



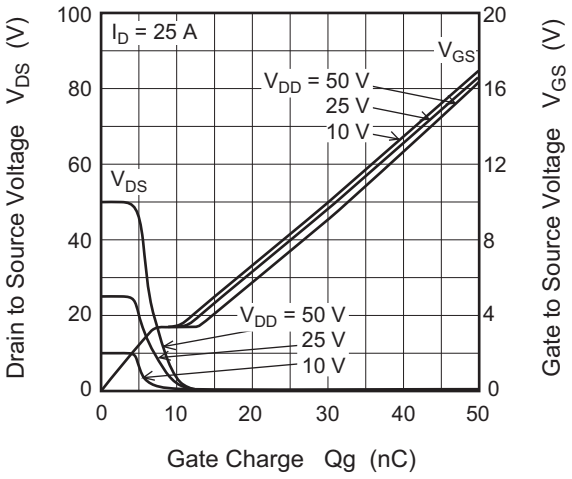
Static Drain to Source on State Resistance vs. Temperature



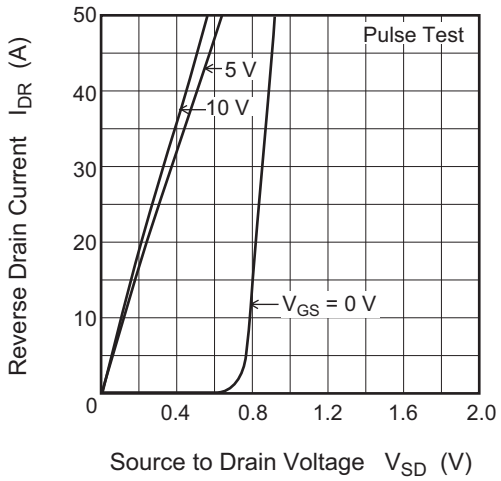

Typical Capacitance vs. Drain to Source Voltage



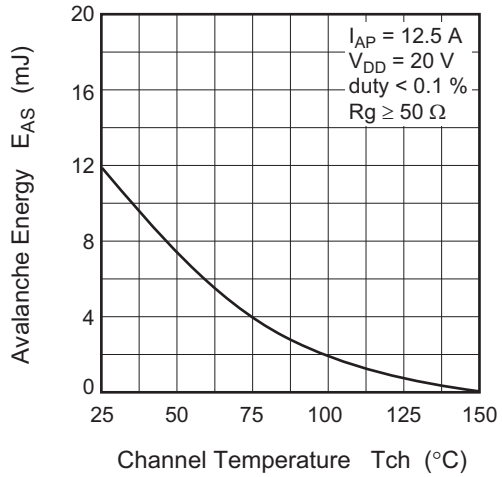

Dynamic Input Characteristics



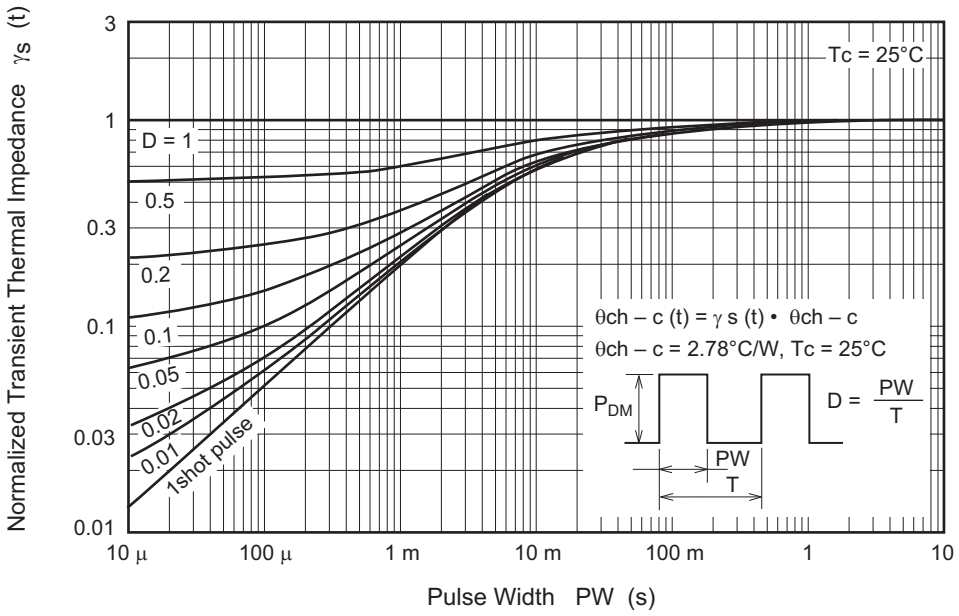

Reverse Drain Current vs. Source to Drain Voltage



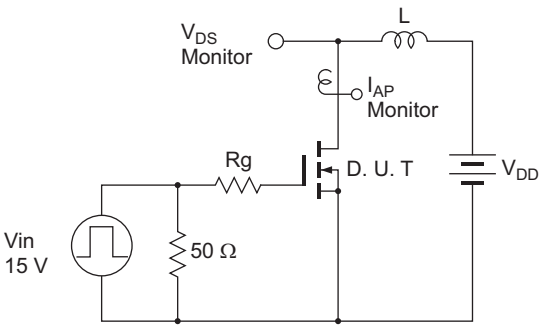

Maximum Avalanche Energy vs. Channel Temperature Derating



Normalized Transient Thermal Impedance vs. Pulse Width

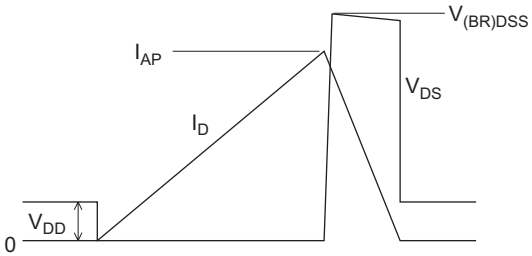



Avalanche Test Circuit

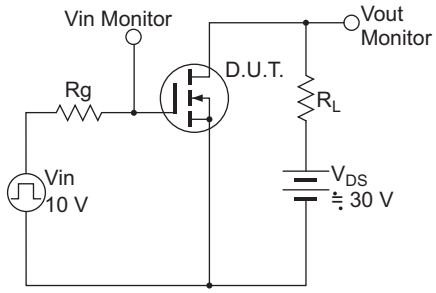



Avalanche Waveform

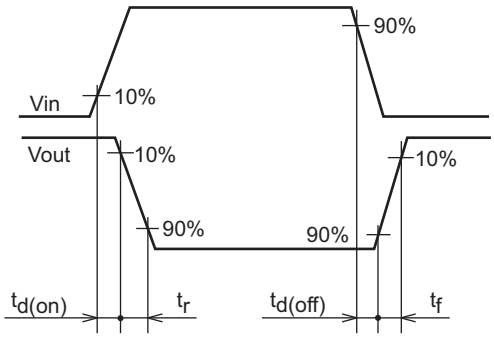
$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$




Switching Time Test Circuit



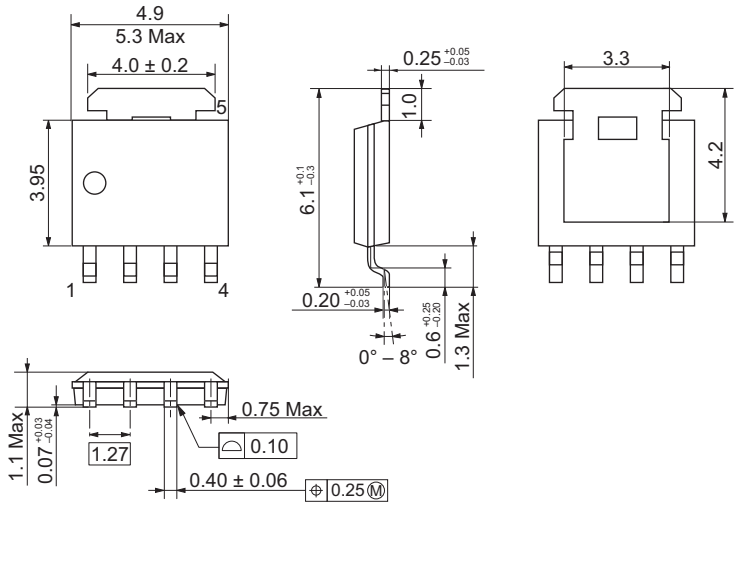

Switching Time Waveform



## Package Dimensions

| Package Name | JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|---|---|---|---|---|
| LFPAK | SC-100 | PTZZ0005DA-A | LFPAKV | 0.080g |

Unit: mm




(Ni/Pd/Au plating)

## Ordering Information

| Part No. | Quantity | Shipping Container |
|---|---|---|
| RJK0651DPB-00-J5 | 2500 pcs | Taping |

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